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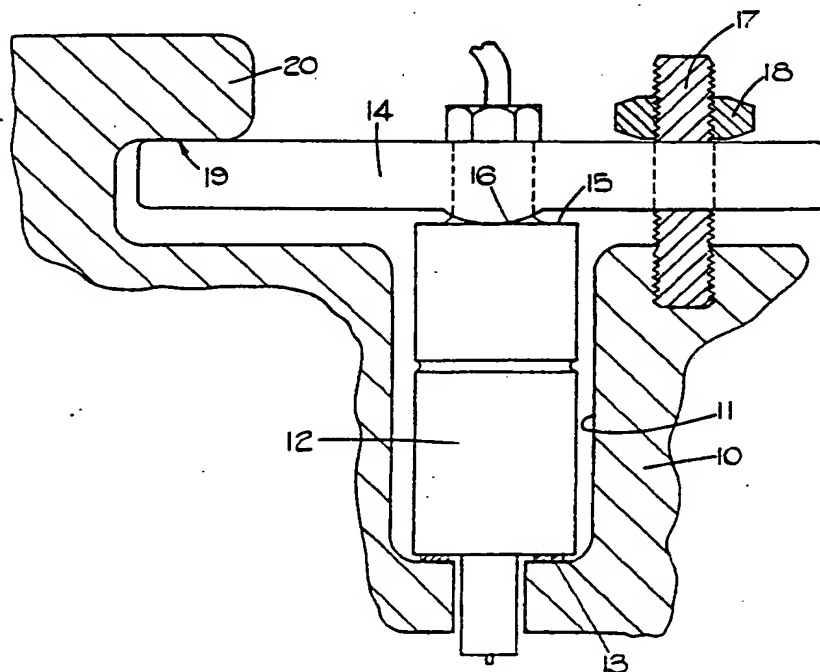
None

(58) Field of search

F1B

## (54) Clamping fuel injectors on I.C. engines

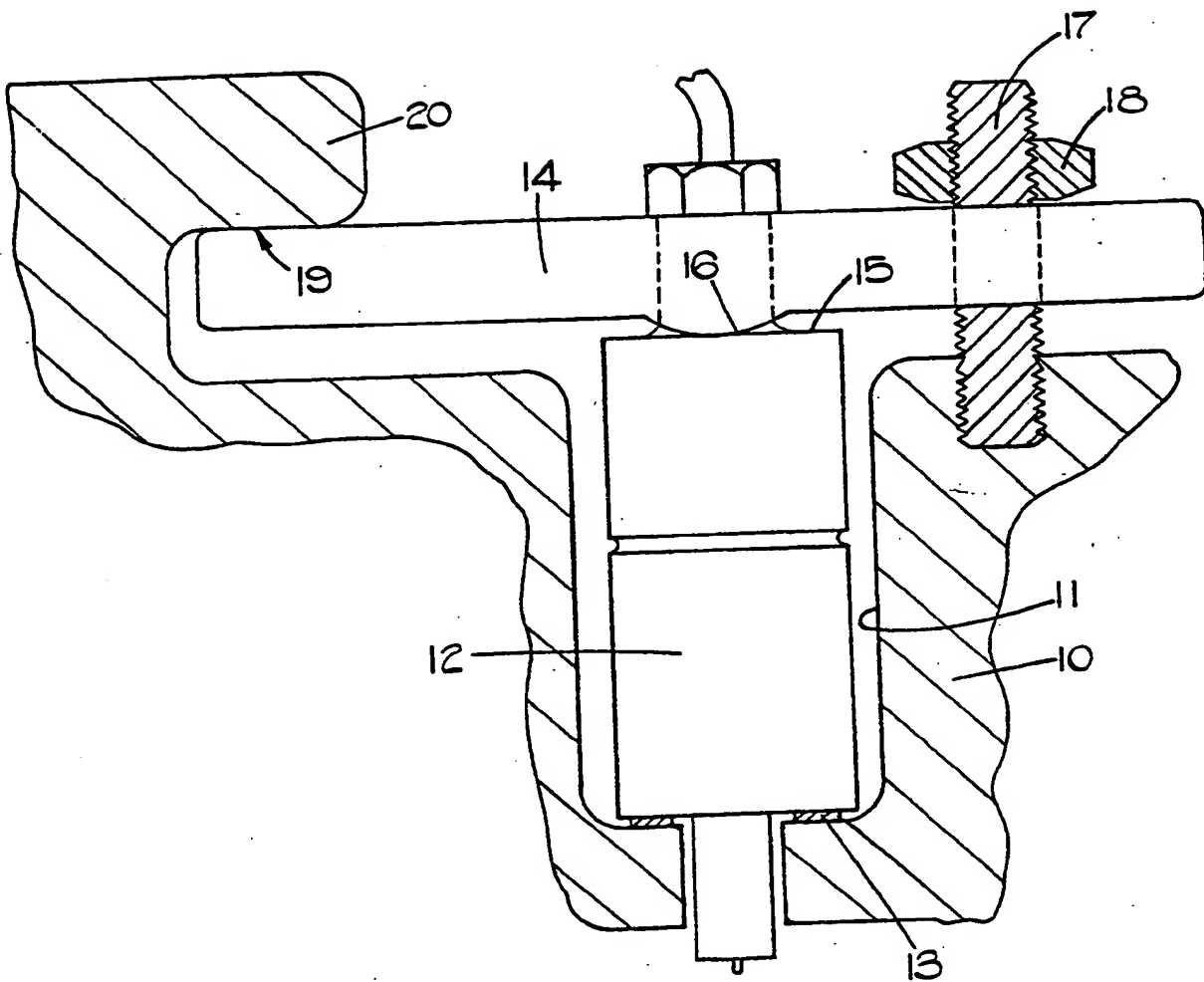
(57) An elongated member 14 which intermediate its ends engages the injector 12 is engaged by a nut 18 at one end. The other end of the member 14 is located beneath a surface 19 defined on a part 23 integral with the cylinder head. As the nut 18 is tightened on a stud 17 a clamping force is applied to the nozzle.



GB 2 153 908 A

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## SPECIFICATION

## Internal combustion engine

5 This invention relates to internal combustion engines and in particular to a clamping arrangement whereby a fuel injection nozzle can be retained within a bore in a cylinder head of the engine.

10 It is known to provide a screw threaded bore in the cylinder head of an engine to receive a fuel injection nozzle, the nozzle having a complementary screw thread. Such an arrangement is only practical when the outlet

15 orifice of the nozzle is disposed on and extends along the longitudinal axis of the nozzle since in this case the final angular position of the nozzle within the bore does not matter. In cases where the final angular setting of the

20 nozzle within the bore is important it is the practice to use a clamp and one form of clamp is shown in British Published Application 2100334A. The clamp comprises an elongated member which is apertured inter-

25 mediate its ends to receive the body of the injection nozzle and is shaped to define surfaces which engage surfaces on the body of the nozzle. The elongated member is also provided with apertures adjacent its ends re-

30 spectively to receive bolts or studs which are engaged within threaded bores in the cylinder head. Another form of clamp comprises an elongated member which is forked at one end for engagement with the nozzle body. Inter-

35 mediate its ends the member is provided with an aperture to receive a retaining bolt engaged in a bore in the cylinder head and its other end is engaged with a projection or the like on the cylinder head. The second form of

40 clamp only requires one threaded hole in the cylinder and only one bolt but the clamping force which can be applied to the nozzle body is less for the same size of bolt or stud, than can be achieved with the first form of clamp.

45 The object of the present invention is to provide an internal combustion engine in a simple and convenient form.

According to the invention an internal combustion engine comprises a cylinder head, a  
50 bore formed in the cylinder head to receive an injection nozzle, an elongated member shaped intermediate its ends to engage a nozzle located in said bore, means engageable with one end of said elongated member to generate a clamping force on a nozzle located in  
55 said bore, and a surface defined on a part integrally formed with the cylinder head of the engine and engageable with the opposite end of the elongated member.

60 An example of an internal combustion engine in accordance with the invention will now be described with reference to the accompanying drawing in which the single view is a part sectional side elevation of a portion of the  
65 cylinder head of an engine showing an injection nozzle clamped in position.

Referring to the drawing a portion of the cylinder head of an internal combustion engine of the compression ignition type, is seen  
70 at 10 and formed in the cylinder head is a stepped bore 11 the inner and narrower end of which extends into a combustion chamber of the engine. Mounted in the bore is a fuel injection nozzle 12 the narrower end of which  
75 extends into the combustion chamber. A sealing washer 13 is provided to assure a gas tight seal between the nozzle 12 and the step defined in the bore.

In order to clamp the nozzle within the bore  
80 a clamping member 14 of elongated form is provided and at a position substantially midway between the ends of the clamping member an aperture is formed therein and through which in use, extends a portion of the body of  
85 the injection nozzle. The body of the nozzle defines a surface 15 against which can engage shaped projections 16 formed on the clamping member 14, the projections defining convex surfaces presented to the surface 15.

90 Adjacent one end of the clamping member there is formed an aperture through which in use, extends a retaining bolt or stud 17, this being secured within a threaded bore formed in the cylinder head. The stud is engaged by a  
95 nut 18 which can be tightened to generate a clamping force which is applied to the nozzle body. The opposite end of the clamping member engages beneath a surface 19 which is defined on a part 20 which is integrally  
100 formed with the cylinder head of the engine. The surface 19 forms a reaction surface so that as the nut 18 is tightened a clamping force is applied to the nozzle.

The part 20 is readily formed during the  
105 manufacture of the cylinder head of the engine and the provision of the part 20 reduces considerably the cost of manufacturing the cylinder head as compared with the construction shown in Published Application

110 2100334A. Firstly only one screw threaded bore has to be formed to receive the stud 17 and secondly where two threaded bores are provided, the alignment of the threaded bores together with the bore in which the nozzle is  
115 located, has to be accurately controlled. Moreover, depending on the lever ratio, for a given stress in the stud the clamping force applied to the nozzle is higher than in the single bolt or stud arrangement described in the second  
120 paragraph of the specification.

## CLAIMS

1. An internal combustion engine comprising a cylinder head, a bore formed in the  
125 cylinder head to receive an injection nozzle, an elongated member shaped intermediate its ends to engage a nozzle located in the bore, means engageable with one end of said elongated member to generate a clamping force  
130 on a nozzle located in said bore, and a surface

defined on a part integrally formed with the cylinder head and engageable with the opposite end of the elongated member.

2. An engine according to Claim 1 in  
5 which said elongated member defines projections having convex surfaces for engagement with the nozzle.
3. An internal combustion engine substantially as hereinbefore described with reference  
10 to the accompanying drawing.

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